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ABSTRACT

This paper analyzes some of the educational assumptions that underlie the use of free-choice situations in the classroom and describes a study that examined the effects of giving students control over their curriculum. Subjects for the study were 38 fourth- and fifth-grade students in a low-income school. Students were divided into two groups that were matched according to the students' age, sex, and initial achievement level in math. Students in the free-choice group were allowed to select problems at whatever level of difficulty they wanted; students in the yoked control group were given problems of preselected difficulty. Results of the study indicate that allowing students to choose their own curriculum might have more positive effects on attentional and affective levels than on academic performance. (Author/JG)

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Student Control and Choice:
Some Theoretical Assumptions and Cautions Based Upon Research

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The current interest in open education models lends added importance to research concerned with theoretical and empirical support for this type of educational approach. In this paper we will attempt to both present and analyze some of the educational assumptions that underlie the use of free choice situations in the classroom and describe some of our research that may illuminate factors to be considered in giving students control over their curriculum.

Although its advocates differ in how much choice children should have in their learning, "open education" is typified by a belief that children should play an active part in selecting and pacing curriculum. Barth (1972) has identified several "open education" assumptions involving student choice: 1.) children are competent in making significant decisions concerning their own learning; 2.) given a choice, children will engage in activities that will be of high interest to them; 3.) children should be allowed to set their own pace; 4.) this freedom of choice in pace and difficulty level will result in intrinsic motivation which will, in turn, promote an optimal level of learning. There seems, then, to be two major kinds of assumptions underlying the advocacy of student choice in open education; one involving the choices that students will make when given the oppurtunity, and the other invo lving the motivational and performance consequences of having choice. For each of these types of assumptions there exists some relevant educational and psychological theory and research.

The first assumption that students will choose problems and tasks that are most relevant to their interests and abilities is consistent with Hunt's (1965) theory of intrinsic motivation. According to Hunt, in order for a child's intellectual development to be maximized the optimal pairing of the

child's needs and competencies with the correct remediation must take place. The difficulty of course, is the identification of this ideal mating. This Hunt terms the "problem of the match". Hunt sees the function of the match as an inverted U-shaped curve that describes the relationship of the circumstances and the level of developed capacity, i.e., what the child has already learned and the task put before him. Hunt feels that in order to sustain interest a small discrepancy must exist between circumstances and central processes. Too little discrepancy and the child becomes bored; too much and he is overwhelmed and will avoid the situation. This discrepancy arouses interest by presenting a novel situation. The problem, of course, is how much of a discrepancy? That is, what is the correct "match" between competency and challenge? Hunt, like the open educator, believes that the child is the best judge of the proper match. Given choice, the child will seek his own level and maximize his learning.

Although Hunt's theory has been used by some to justify giving students choice over content or difficulty level of curriculum, there is little experimental evidence directly relevant to the assumption that children will make "optimally matching" choices. A review of studies involving student choice in computer assisted instruction (CAI) and programmed instruction (Mager & Clark, 1963) concluded that, "adult learners learn as well and do so in much less time when they have complete control over what, how, and when they learn then when their courses are designed by experts". However, there is not much experimental evidence bearing on children's educational choices. That which there is suggests that the choices that will be made may be strongly related to certain characteristics of the students and of the educational situation. Several studies (e.g., de Charms & Carpenter, 1968; Weiner, 1972) have shown that individuals

high in "achievement motivation" tend to select moderately difficult problems; whereas, individuals low in acievement motivation tend to choose either extremely easy or extremely difficult problems. Blackwell (1974) found that children who attribute their behavior to themselves ("origins") make more moderate difficulty choices then do children who think their behavior is due to external causes ("pawns"). However, there is also evidence suggesting that individuals can be influenced to make more moderately difficult choices by training (de Charms, 1972) or by altering chara cteristics of the learning situation such as the reward contingencies (Blackwell, 1974). It seems, then, that it cannot be assumed that all children will make "optimally matching" choices of moderate difficulty; some may choose extremely easy or extremely difficult tasks that would presumably have little educational benefit. However, research also suggests that educational situations or methods can be devised to foster such choices. Though it has been claimed by some that certain groups of children (e.g., low income or minority group children) will not or cannot be influenced to make "optimal" choices, the few studies involving choices of children from such populations (e.g., de Charms, 1972) suggest otherwise.

The second major type of assumption underlying open education involves the motivational consequences of having choice rather than the actual choices that are made. According to attribution theory, having choice facilitates attributions of control and causality. With the further assumption that (at least one of) man's primary motivation(s) is to be effective in producing changes in his environment (White, 1959) and to be the most significant cause of his own behavior (de Charms, 1968), having choice in a learning situation should foster motivation and learning. There are only a few studies directly or indirectly rele-

vant to this assumption. Kuperman in de Charms and Carpenter (1968) found that persons who had free choice in how to construct a designated model became more involved and, when interupted, wanted to complete the building more than persons who were given detailed instructions as to how the model was to be built; Blackwell (1974) found that children who perceived that they had more choice in learning situations had more (general) feelings of control and causality of their own behavior and showed more intrinsic task motivation (i.e., spent more time on a task when there were no extrinsic rewards for engaging in or accomplishing that task) than did children who perceived less self-choice in learning situations; de Charms (1972) found with an inner city Black population that individuals who had more feelings of control and causality (either "naturally" or after participating in a training program) showed more motivation and achievement in academic tasks than did their peers who felt that their behavior was caused by forces outside their control. If one assumes, with some attribution theorists, that the heavy use of extrinsic rewards for an individual's behavior will lead the individual to attribute his behavior to the rewards rather than to his own intrinsic motivation or choice, then the several studies demonstrating detrimental effects of extrinsic rewards on intrinsic motivation are relevant to the assumption that choice facilitates intrinsic motivation and non-choice (or the perception of non-choice) impedes it. Deci (1971), Lepper, Greene and Nesbitt (1973) and Blackwell (1974) are only a few of many studies showing that rewarding a person with extrinsic rewards such as grades, points or money for behavior which he would choose to do without such rewards, i.e., behavior for which he is intrinsically motivated, decreases the time or intensity the individual will choose to devote to that behavior especially when the extrinsic rewards are removed. It seems likely that this detrimental effect would be due to

an individual's feeling that his behavior was being controlled and caused by the extrinsic rewards rather than by his own choice, though there is no direct experimental evidence to support this contention.

There is, then, quite consistent though somewhat fragmented experimental support for the assumed positive motivational and performance consequences of student choice in the learning process. However, it seems clear that it cannot be assumed that all students in all situations will make choices which are "optimal" for motivation or learning. Some studies do suggest, though, that with provision of the appropriate learning conditions and/or training, most persons will make such choices. Investigation of the characteristics of people and learning situations which are related to "optimal" choices is just beginning. The rest of this paper will report our preliminary research findings relevant to the choices certain students will make and the motivational and performance consequences of these choices. We then offer suggestions for further research more specific to the conditions or training necessary to prom ote optimal choices.

The purposes of our study were (a) to determine whether children who were allowed to choose the difficulty levels of their arithmetic problems in a CAI task would show greater engagement in learning than children who were not given a choice, (b) to discover possible patterns in the choices made, and (c) to determine the relationship of attributions of causality (locus of control) to engagement in the task. The subjects were fourth and fifth grade students, mostly Mexican-Americans, in a low-income school. Thirty-eight students were assigned to either a choice or a yoked control condition, and pairs of subjects were matched on age, sex and initial achievement level (IAL) in math. The choice condition allowed the students to select problems at whatever level of difficulty they wanted; the yoked control condition presented the students with problems at

preselected difficulty levels. Individuals in both conditions used a modified form of the Math Drill and Practice program by Suppes, Searle and Lorton (1975).

Each student participated in 15 CAI sessions where task-specific attention or inattention was measured by an engagement/disengagement observation instrument used by observers during every CAI session to record the behavioral responses of each subject. A 28 item locus of control (LOC) measure with four dimensions (stable/unstable, control/no control, internal/external, and self/other) was administered three times to all participants.

The results of our study will be discussed in turn as they relate to the major assumptions underlying open education previously discussed.

First, do students make optimal choices, i.e., do they choose tasks which are moderately difficult for them? In our study the children could select problems which ranged from 1.00 to 7.50 grade levels. The grade levels of problems most frequently chosen broke down into two distinct classes, i.e., one subgroup (N=8) selected the lower level problems most often while another subgroup (N=5) chose problems that were at the higher end of the grade continuum. Six children made too few choices to be classified into either of these subgroups. We named the children whose selections of problems were near the lower end of the grade level continuum "Maximizers" because their choices led to nearly 100% correct response rates on the computer. Conversly, the children who consistently selected the most difficult problems and seldom exceded 50% correct were named "Minimizers". In our sample, at least, contrary to Hunt's theory (1965), it can be seen that few if any students consistently made choices which could be considered of optimal difficulty level for them.

Second, does having choice foster motivation and learning? We administered a locus of control scale on three separate occassions during the course of the

study and comparisons between groups clearly demonstrated that the choice group made significantly more attributions to factors that were directly under the children's control. The choice group children more frequently believed their success or failure on the task was related to the types of problems they chose and the amount of effort they exerted to solve problems. Thus, in our investigation having choice led the children to attribute more personal responsibility for their learning behavior and consequences. Our data also indicate that the students in the choice group were sifnificantly more attentive to the learning task than students in the non-choice group. Choice students showed consistently higher engagement in the learning task for all their fifteen days on the computer. Although these results supported the assumptions of the motivational benefits of <u>having</u> choice, the results were not as supportive of the assumed benefits of the choices actually made. For some students the highest levels of engagement were associated with the most frequently chosen difficulty levels but for others this was not true. Whereas the engagement of the Maximizers was highest while working on the problems they most frequently chose; the engagement of the Minimizers was highest while working on the problems they <u>least</u> frequently chose. For both groups it was the easy problems which were related to higher engagement. Therefore in our study, Hunt's assumptions that children will select academic problems which are optimally stimulating and more complex than those previously worked held for only some of the students and not for others.

Thus in light of the two major assumptions of open education our study tends to reinforce research that has gone before. Giving students choice in the difficulty and pace of their academic work appears to foster attr ibution of self-responsibility and motivation in task. However, under such circumstances it is

clear that not all students will necessarily make difficulty level choices that could be considered optimal for learning and motivation in task. On the contrary, our findings indicate that certain students consistently chose problem levels that are extremely difficult for them despite the fact that working at these difficult problems is accompanied by low engagement.

All the research that we have discussed, both ours and others, is experimental in nature and necessarily only an approximation of what actually may occur in the real classroom. Nevertheless, its implications for open education are real enough and any further investigations should proceed with these findings in mind. For if further research concurs, what does this mean in terms of giving choices over curriculum to all students? This, of course, is the crux of open education. It would appear that for some students conditions and/or training must be induced to promote optional choice which would not otherwise occur. In order to do so, those students who would not likely make optimal choices need to be identified. Although some studies have shown that such variables as achievement motivation, origin-pawn, etc., are related to the types of choices students are likely to make, further work dealing with the relationship between student characteristics and choice patterns must still be done. However, pending future studies, our research suggests ways of identifing choice patterns via student behavior observation in choice situations. In our investigation choice patterns, i.e., maximizing and minimizing, which proved to be consistent over as long as fifteen days ~~converged~~ emerged almost from day one. These findings indicate that a test could be constructed for identifying student choice-patterns, since the children in our study exhibited specific patterns on the first or second day of working problems. Such a test could present children with a set of mathematics problems, for example, which would differ in difficulty (grades) levels

and they would be asked to select the levels which they prefer to work. The children could then be classified in terms of whether they selected the easy problems and obtained a score of about 90% correct (Maximizers), or chose the most difficult problems and obtain a score of about 50% (Minimizers). A third subgroup might be distinguished where the children choose problems of average difficulty levels and answer at least 70% of the problems correctly. This group would probably represent children who would adopt an "optimizing" strategy in various choice settings, i.e., they would attempt to maintain a relatively high percentage of correct, while at the same time, selecting progressively more difficult problems.

An outline of such a test might resemble the following;

1. Arithmetic items which are graded from the 1st through 6th grades might be selected. The work of Suppes, Searle and Lorton (1975) could serve as a basis for selecting problems.
2. The problems would be presented individually at different grade levels for one hour.
3. The procedure for working problems and moving on to new ones would involve: (a) completing each item within a fixed amount of time (about 20 seconds based on Suppes, et al., 1975), or (b) moving to a new problem if an item is not completed within 20 seconds.
4. After each problem is completed, ask the child whether he wants to work harder, easier or the same type of problem as he previously worked. If the child chooses either "harder" or "easier", then he would be asked if he wants a little, a moderate amount or much easier or harder problem (increments of 0.3 grade level). The next problem is then presented based upon the child's

choice of difficulty level.

5. Use the criteria cited above to identify Maximizers and Minimizers.

Once such a testing procedure was developed and utilized the next logical step would entail the initiation of a training procedure for the identified choice patterns. In order to improve the children's choice behaviors various types of learning parameters may be manipulated. For example, one could restrict the range of mathematics problems worked by Maximizers and Minimizers in order to improve their performance. Thus, the Maximizers could begin working problems which were equivalent to their achievement levels and would not be allowed to select problems below this level. Such a situation may lead Maximizers to work problems above their present achievement levels because they would be less likely to expect 90-100% success rates at any level of problems presented to them. Therefore, the likelihood of their becoming fixed at the lowest level of problems (their present achievement level) would probably be less than if they began working at one or two grade levels below their achievement level.

What range of grade levels should the Minimizers receive in order to increase their achievement levels? It appears that the major goal of their training sessions would be to limit the highest levels worked by Minimizers until they obtained an acceptable percentage correct at these upper levels. After fulfilling this performance criterion, the upper limit of problems could be one grade level above the Minimizers achievement levels, and changes in this level could be made as a function of their performing successfully.

The exact specification of the training procedures cannot be described at this time since there have been no previous systematic studies dealing with the training of children to make effective curriculum choices.

After the identification and training of students in choice behaviors was completed, some sort of intervention research would appear to be desirable in order to test the effectiveness of the proposed procedures.

It is apparent that there is much yet to be done in this area of investigation and that these are but a few suggestions for future work. However, it is felt that in the light of our study and others available ~~that~~ the assumption that all children, when given the opportunity, will make choices that will lead to optimal learning and motivation cannot be made. Still, this research does indicate that it may be possible to identify students who are <u>not</u> likely to make optimal choices and to provide them with training or modified learning situations that may foster optimal choices akin to those that proponents of open education have hoped for.

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